
EVERMANNICHTHYS BICOLOR, A NEW GOBY (TELEOSTEI: PERCIFORMES: GOBIOIDEI) FROM NAVASSA ISLAND

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ABSTRACT. *Evermannichthys bicolor*, a new gobioid fish, is described from the Caribbean island of Navassa. This species was previously considered to be a variant morph of *Evermannichthys convictor* Böhlke and Robins, 1969, with slight meristic differences and a distinct color pattern. Capture of a new specimen from Navassa, larger than those previously described, confirms that the different color pattern is maintained with growth rather than being a transitory ontogenetic stage of *E. convictor*. The five *Evermannichthys* species occur in the Western Atlantic and are associated with barrel sponges. Two *Evermannichthys* species are widely distributed: *E. spongicola* (Radcliffe, 1917), around the coast of the southeastern United States and the Gulf of Mexico, and *E. metzelaari* Hubbs, 1923, on islands ranging from the Bahamas throughout the Antilles to islands off the coasts of Panama, Nicaragua, and Belize. The other three species (*E. bicolor*, *E. convictor*, and *E. silus*) are known from highly restricted areas. A map is given that illustrates all five species' distributions.

INTRODUCTION

Navassa Island is a very small (4.86 km²) Caribbean island located at 18°25'N, 75°01'W in the Jamaica Passage approximately 112 km northeast of Jamaica and 64 km west of Haiti. The island is an uninhabited U.S. territory (designated a National Wildlife Refuge on December 3, 1999), rarely visited because it lacks fresh water; the terrain is rocky and hazardous, and its steep shelf-like coastline makes it difficult to anchor boats at most locations around the island. In April–May 1999 an expedition organized by the Center for Marine Conservation visited the island to conduct surveys of terrestrial and marine life. A previous expedition, focusing on the terrestrial fauna, had revealed that Navassa has a surprisingly complex biota for an island of its size, with many endemic species of arthropods and plants. The 1999 survey was undertaken to document the fish fauna around Navassa, to verify records from an earlier survey, and to generate a more complete assessment of the fauna.

The coastline and nearshore environments of Navassa consist primarily of a steep dropoff to approximately 25 to 30 m or more, to a sand bottom with many scattered rocks and boulders, an environment that precludes the growth of most corals. The northeast tip of the island grades more gently into sand substrate and supports a small, shallow coral reef grading into a deeper reef on an adjacent shelf at about 30 m deep.

METHODS AND MATERIALS

In a total of 38 stations using rotenone, hook and line, night light/dip net, and visual surveys, 203 fish species were documented, including 147 new records for Navassa and five new species. All of the undescribed species collected were small, cryptic species taken from rotenone collections and include two blennioids, two clingfishes, and a goby. The goby was captured just north of Lulu Bay on the west side of the island using rotenone and SCUBA off the vessel *Quest* at anchor.

One specimen, a 20.9-mm standard length (SL) male with a distinctive color pattern—dark on the dorsal third of the body, pale on the remainder, with a yellow cast to the head and throat and unpigmented fins—was identified as a member of the genus *Evermannichthys*, a group of small, sponge-dwelling gobies distributed throughout the tropical western Atlantic Ocean (Figure 1). In their review of *Evermannichthys*, including descriptions of two new species, Böhlke and Robins (1969) discussed three specimens of *Evermannichthys* from Haiti that differ from *E. convictor* in color pattern and meristic counts. They referred to these specimens as bicolored variants of *E. convictor* because the meristic counts overlapped and one of the small Haitian specimens seemed to approach the *E. convictor* color pattern. The new specimen matches the description of this variant morph of *E. convictor* but is larger than all the *E. convictor* specimens and variants described by Böhlke and Robins (1969). The capture of this specimen confirms that the variant color pattern is maintained in larger fish, rather than being a transitory developmental stage, and therefore warrants description of this form as a distinct species. Herein, I describe the new species and

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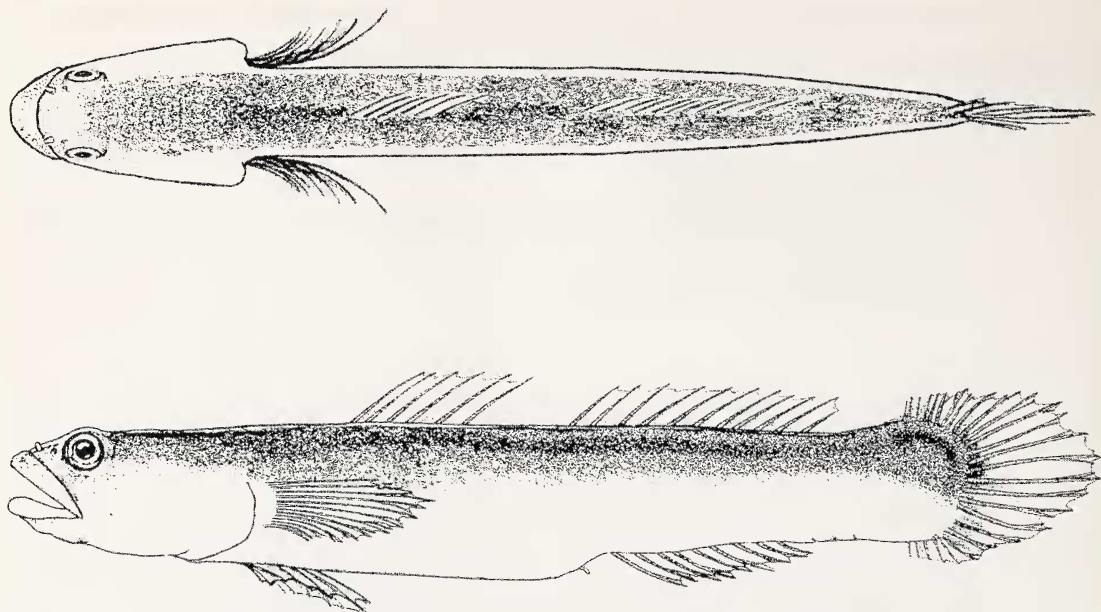


Figure 1 Illustration of the holotype of *Evermannichthys bicolor*

designate the specimens originally considered to be variants of *E. convictor* as paratypes. An additional *E. convictor* specimen (catalogued at the Florida Museum of Natural History: UF 228365) from the north coast of Jamaica has also been identified as the new species. Thus, the range of *E. convictor* is restricted to the Bahamas, and the new species occurs in Jamaica, Navassa, and Haiti. Two other *Evermannichthys* species also have restricted geographic distributions, and the remaining two are widespread (Figure 2).

Abbreviations: ANSP: Academy of Natural Sciences, Philadelphia, Pennsylvania, USA; LACM: Natural History Museum of Los Angeles County, Los Angeles, California, USA; UF: Florida Museum of Natural History, Gainesville, Florida, USA.

SYSTEMATICS

Family Gobiidae

Genus *Evermannichthys* Metzelaar

Evermannichthys Metzelaar, 1919:139–140, figs. 39, 40. Type species *E. metzelaari* Hubbs, 1923:2 (by monotypy).

Radcliffella Hubbs, 1921:2. Type species *Garmannia spongicola* Radcliffe, 1917:423–425, fig. p. 424 (by original designation).

DIAGNOSIS. Diagnosis of the genus provided by Böhlke and Robins (1969); prominent diagnostic characters include: squamation reduced, confined to several lateral series or only a few scales ventrad on caudal peduncle; first dorsal fin with 3 to 7 spines, the first two clustered more closely than remainder; segmented caudal rays 17; pectoral fin

rays 11 to 14 (rarely 14); total second dorsal elements 11 to 16; total anal elements 9 to 14 (rarely 14); tongue tip free and broad, truncate or emarginate to bilobed; pelvic disc present, fins joined both anteriorly and posteriorly; no teeth on vomer or palatines; total vertebrae 29 to 36; rostral frenum present, binding upper lip with snout.

REMARKS. The type species was originally described as *E. spongicola* Metzelaar, 1919. Hubbs (1921) renamed *Garmannia spongicola* Radcliffe, 1917, *Radcliffella spongicola*, and subsequently Hubbs (1923) assigned that species to *Evermannichthys*, resulting in a homonym with *E. spongicola* Metzelaar, 1919. To remedy this, Hubbs (1923) proposed a new name for the type species *E. spongicola* Metzelaar, 1919: *E. metzelaari* Hubbs, 1923.

Evermannichthys bicolor new species

(Figs. 1, 2)

E. convictor Böhlke and Robins, 1969:11–13 (*partim*: see their remarks on p. 13).

HOLOTYPE. LACM 54100-3. A 20.9 mm SL male collected at Navassa Island, Caribbean Sea, at a rotenone station (stn. NAV 99-29) off the west side of Navassa, just north of Lulu Bay (18°24.18'N, 75°1.67'W). The habitat was a sand flat with scattered rocks, gorgonians, and sponges. Rotenone was deployed around and in a clump of barrel sponges and gorgonians at a depth of 27–30 m. Collected on May 8, 1999, by Bruce Collette, Jeff Williams, and Christine Thacker.

PARATYPES. ANSP 110893 (1, 11.8), Port-au-Prince Bay, Pelican Cays, Haiti; ANSP 110894 (1,



Figure 2 Map showing distribution of *Evermannichthys* species. The type locality of *E. bicolor* is circled. The overlapping localities of *E. metzelaari* and *E. bicolor* on Haiti were taken at the same station. These data were compiled from published records described in Böhlke and Robins (1969), as well as catalogues of the Academy of Natural Sciences, Philadelphia, Gulf Coast Research Laboratory, Florida Museum of Natural History, University of Michigan Museum of Zoology, United States National Museum, and the Museum of Comparative Zoology

12.1) Gulf of Gonave, Sable Island, off SE coast of Gonave Island, Haiti; ANSP 11376 (1, 13.5) Gulf of Gonave, St. Marc Channel, off Mount Rouis, 2 mi. SE of Mount Rouis Town proper on Port-au-Prince–St. Marc Road, Haiti. These specimens were originally identified as *E. convictor* by Böhlke and Robins (1969) but are here designated as paratypes of *E. bicolor*.

ETYMOLOGY. This species is named “bicolor” (combination of the Latin “bis,” meaning two, and the Latin “color,” meaning hue or tint, and is used as a noun in apposition) for its distinctive color pattern: dark on the dorsal third, pale on the remainder of the body. The name also follows Böhlke and Robins (1969), who identified three specimens of *E. bicolor* as bicolored variants of *E. convictor*.

DIAGNOSIS. An *Evermannichthys* with dorsal spines V–VI, second dorsal elements 11 (first element is a spine, the remainder are soft rays), anal rays 9, and pectoral rays 13 (rarely 14). Color pattern distinctive (in both preserved and live speci-

mens), uniformly dark on dorsal third of body and pale on remainder, differing from the dark dorsal bars or saddles seen in *E. spongicola* and *E. metzelaari*, the uniform covering of tiny melanophores in *E. convictor*, and the pale coloration of *E. silus* Böhlke and Robins 1969. *Evermannichthys bicolor* also differs from other *Evermannichthys* in possessing clear median and paired fins; varying degrees of pigmentation are seen on the fins of all other *Evermannichthys* species. The snout of *E. bicolor* is intermediate between the blunt condition seen in *E. silus* and *E. convictor* and the pointed condition found in *E. spongicola* and *E. metzelaari*. The frenum connecting the upper lip to the snout much reduced compared to other *Evermannichthys*. In paratypes, the frenum is small, and in the holotype, it is not present: the upper lip and snout are clearly separate.

DESCRIPTION. Counts and measurements follow Böhlke and Robins (1968:49–50) and are given for the holotype of *E. bicolor* in Table 1 along with

Table 1. Counts and measurements of *Evermannichthys convictor* and *E. bicolor* types.¹

	Dorsal spines		Dorsal rays			Anal rays			Pectoral rays			Meristic index ²							Total vertebrae		
	5	6	11	12	13	9	10	11	12	13	14	14	15	16	17	18	19	29	30	31	
<i>E. convictor</i>	2*	2		2*	2		2	2	1	7*				1	1	1	1		2	2	
<i>E. bicolor</i>	3	1*	4*			4*				7*	1	1*	3					1*	2		
Measurements																					
(% standard length, mm)																					
					<i>E. convictor</i> types								<i>E. bicolor</i> types								
Standard length					14.1		14.5		14.8		15.7		20.9		11.8		12.1		13.5		
Head length					24		23		24		22		25		26		26		25		
Depth at dorsal fin origin					13		16		14		15		14		13		15		12		
Caudal peduncle depth					13		14		12		13		12		10		13		12		
Eye diameter					6.2		5.5		6.1		5.7		4.8		5.9		6.2		5.2		
Snout length					4.9		4.8		5.4		4.5		5.3		5.9		5.8		5.2		
Upper jaw length					9.7		10		12		10		10		12		11		11		
Pectoral fin length					21		20		20		18		19		22		22		21		
Ventral fin length					20		21		19		20		19		21		20		19		
Caudal fin length					22		20		20		20		18		21		21		21		
Sex					F		F		M		F		M		F		M		F		
Catalog number					ANSP		ANSP		ANSP		ANSP		LACM		ANSP		ANSP		ANSP		
					111864		111862*		111863		111863		54100-3*		110893		110894		111376		

¹ Asterisk (*) indicates holotype.
² Meristic index is the number of second dorsal elements plus anal elements minus first dorsal spines.

data on *E. convictor* types and “non-types” (= *E. bicolor*) presented in Böhlke and Robins (1969). For both the second dorsal and anal fins, the first element is a spine and the remainder are soft rays; the most posterior ray is split to its base and counted as a single element. Vertebral number was determined from radiographs.

The dorsal fins are widely spaced, and the pectoral, anal, and caudal fin rays are branched distally. The tongue is emarginate, and squamation is restricted to a row of three scales ventrally on the caudal peduncle and one or two pairs of scales ventrolaterally on the caudal peduncle at the margin of the caudal fin. The scales are ctenoid with prominent ctenii; only the ventral caudal peduncle scales are easily visible in preserved specimens, and the ventrolateral pairs are best observed from radiographs. Dentition is similar to *E. convictor*: teeth are biserial anteriorly, becoming uniserial posteriorly. Enlarged, recurved teeth are found in the outer tooth row of the upper jaw and the inner tooth row of the lower jaw. The first two pterygiophores of the spinous dorsal fin are more closely spaced than the remainder, and the dorsal spine formula (following Birdsong et al., 1988) is 3-21111. There are thirty total vertebrae: 13 precaudal and 17 caudal.

COMPARATIVE MATERIAL EXAMINED. Holotype of *E. convictor*: ANSP 111862 (1, 14.5). Paratypes of *E. convictor*: ANSP 111863 (2, 14.8–15.7) and ANSP 111864 (1, 14.1). *E. bicolor* UF 228365 (1, 10.7).

DISCUSSION

Böhlke and Robins (1969) reviewed the genus *Evermannichthys*, redescribing and comparing the two species known at that time (*E. spongicola* and *E. metzelaari*) and describing two new species (*E. silus* and *E. convictor*). The four species vary in counts, most notably in the number of dorsal spines and vertebrae (Böhlke and Robins, 1969). There are also differences in color pattern and general shape, from slender with a pointed snout (*E. spongicola* and *E. metzelaari*) to more robust with a blunt profile (*E. silus* and *E. convictor*). In their description of *E. convictor*, Böhlke and Robins (1969) discussed three specimens collected in Haiti (two females and one male), which differed from typical *E. convictor* in having one fewer dorsal and anal rays and a distinct color pattern. *Evermannichthys convictor* are uniformly covered with minute melanophores, and the Haitian specimens were darkly pigmented dorsally and pale elsewhere. The pigmentation difference was more pronounced in the females, and the male seemed to approach the *E. convictor* pigmentation pattern. Aside from the pigmentation and meristic differences, the *E. convictor* specimens and the Haitian specimens are similar. Similarities include the pattern of dentition, squamation (restricted to three scales midventrally on the caudal peduncle, sometimes with one or two additional pairs of scales posterior and lateral to the midventral scales), a tongue with an emarginate tip, and a rostral frenum joining the upper lip to the snout. The *E. convictor* specimens described by

Böhlke and Robins (1969) ranged from 14.1 to 15.7 mm SL, and the Haitian specimens were all smaller: 11.8 to 13.5 mm SL. Because of the size difference and the one specimen that appeared to have an intermediate pigment pattern, the possibility existed that the pigmentation variation was simply due to size. However, the new specimen from Navassa is larger than all previously known *E. convictor*, and the persistence of the pigmentation and meristic differences is confirmed. For this study, the Haitian variants and holotype and paratypes of *E. convictor* were reexamined; the pigmentation patterns are distinct and differences in shape are also apparent. *Evermannichthys convictor* has a proportionally shorter head than *E. bicolor* (Table 1). In Böhlke and Robins' specimens, *E. convictor* also appeared to have proportionally shorter pectoral and caudal fins; when the new, large *E. bicolor* specimen is included, it is apparent that the difference is due to the different size classes under consideration and that the relative lengths of the fins change allometrically with size.

All five *Evermannichthys* species are found in association with barrel sponges. *Evermannichthys spongicola* and *E. metzelaari* are commonly found in *Spheciospongia vesparia* (Lamarck, 1841). Several other species of western Atlantic gobies are known to inhabit sponges, including *Risor ruber* Ginsburg 1933; *Pariah scotius* Böhlke, 1969; and a number of *Gobiosoma* species (Böhlke and Robins, 1969; Tyler and Böhlke, 1972). Like *Evermannichthys*, these species have few or no head sensory pores, elongate bodies, and body squamation reduced to few, elevated, strongly ctenoid scales on the caudal peduncle (Böhlke and Robins, 1969). *Evermannichthys* have been recorded at depths of 0.60 to 56.7 m, with most records being deeper than 9 m. Two of the five species are widespread but with nonoverlapping ranges: *E. spongicola* is known from the continental waters of the southeastern United States and Gulf of Mexico, including the west side of the Yucatan Peninsula (depths of 13.7 to 56.7 m), and *E. metzelaari* is found near islands, including the Bahamas south through both the Greater and Lesser Antilles to Curaçao and the Belize barrier reef (depths of 0.6 to 41 m).

The other three species are known only from one or a few collections. *Evermannichthys silus* is known only from the type series taken at Samana Cay, Bahamas (27.4 m), *E. convictor* from the type series collected at Green Cay, Bahamas (13.7 m), and *E. bicolor* from Navassa, Jamaica, and three localities in Haiti (Port-au-Prince Bay and Gulf of Gonave, at depths of 18.3–41.0 m; Figure 2). Specimens are always caught either with ichthyocide or by collecting and cutting up entire sponges, causing

the fishes to be released. The commensal association with sponges is apparently strong, and the elevated caudal peduncle scales may be used for holding position or navigating inside the chamber and channels of the sponges (Böhlke and Robins, 1969); little else is known of their biology.

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